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nerves; this covering becomes transformed into a thick, pigmented, lens-like structure. The "eye" proper consists of vacuolated cells of a prismatic shape; each is swollen at the free end and tapers at the other extremity, at which it is continuous with a nerve fiber.

It is remarkable that in *S. vivipara* no true sensory buds, the cup-shaped structures that are found in many Synaptidæ attached to the axial surface of the base of the tentacles, were discovered.

Nerves which supply the œsophagus and mouth region in *S. vivipara* are described. Similar nerves in *Caudina arenata*, ten in all, were investigated by the present writer.[1] These nerves have been observed in several other holothurians not noted by Dr. Clark, and in view of their widespread occurrence it is not improbable that they may yet be found in most, if not in all, holothurians.

In our brief consideration of this interesting holothurian we have noted the degeneration of the genital duct, the thinness of the walls of the reproductive tubules, and the apertures through the wall of the rectum, — all adaptations parallel with a most peculiar manner of protecting the young; we have considered the marked degeneration of the water vascular system, no radial canals being found even in the larva, and the significant fact that the tentacles in part spring from radial outgrowths of the hydrocoel, as in Cucumaria and Caudina; and, finally, allusion has been made to some features of certain sense organs which are found not only in *Synapta vivipara*, but also in other Synaptidæ.

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Shufeldt's Chapters on Natural History.[2] — The first thing which strikes one in opening this volume is the beauty of many of the illustrations, most of them half-tone reproductions of photographs direct from nature. Dr. Shufeldt has long advocated this method, and the results here presented fully justify his contention. There is a life to these illustrations which is lacking from even the best of products of pencil and brush; the artist represents the animal as he thinks it ought to look; the camera represents the animal itself. To us the best of the illustrations are that of the common swift (Sceleporus), those of the green snake and king snake (*Cyclophis vernalis* and *Ophiobolus rhombomaculutus*), and the first of the cedar bird. The text tells us of the trials necessary in order to get such results, and every amateur in photography knows that not every plate exposed can produce negatives equal to even the poorest in the volume. With such illustrations as a rule, it is a pity that there should be others in the volume, drawn by the author, of a decidedly lower standard.

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[1] J. H. Gerould, The Anatomy and Histology of Caudina arenata (Gould). *Proc. Bost. Soc. Nat. Hist.*, vol. xxvii, pp. 7–74, 8 pl. 1896. Also *Bull. Mus. Comp. Zool.*, vol. xxix, pp. 121–190, 8 pl.

[2] *Chapters on the Natural History of the United States.* By R. W. Shufeldt, M.D. Studer Brothers, New York, 1897. 8°, pp. 472 [+ 8].

Judging from the statements made in the first chapter, the text is intended primarily for younger readers, but the author has not been very successful in writing up (or down) to his constituency. In places he explains at some length points which every boy knows, while in others he assumes a knowledge on their part of facts which of course are familiar to those who, like the author, have spent years in scientific study. Then the book in many places sets a bad example to the young in the way of faulty English, while the proof reading is poor, battered letters, wrong fonts, and bad punctuation and capitalization disfiguring the otherwise fine pages. Again, there are many statements open to question. Thus, on page 146, speaking of the turtles, our author says: "It is with the Batrachia only that they can claim any affinity, as is shown by their structure. From all other existing reptiles they are clearly distinguished by the hard osseous shell that encases their bodies. . . ." On page 74 the statement is made that only two specimens of the rare shark Chlamydoselachus have come into the hands of science. Garman had one; Günther had three specimens when preparing his account in the "Challenger" report. In 1890 a specimen was found off the Madeira Islands, and in 1896 one was found off northern Norway. Besides these, the Japanese have obtained several additional specimens, and as we write we find specimens quoted at about sixty dollars in the catalogues of dealers. Among minor faults, we notice the use of the name Muræenopsis, although years ago Ryder pointed out that this genus had no validity. Fig. 106 should have been credited to Elliott. The trinomial nomenclature introduced here and there is unnecessary, and in the abbreviated form in which it occasionally appears (*e.g.*, *L. g. getulus*) it will be more than confusing to the beginner.

Aside from such shortcomings as those instanced, the volume has the materials for a good book. There is a demand for books which will interest the young in just those lines of study which are sorely neglected in our ordinary text-books. The old-time naturalist had his faults, but he had also his merits, and it is greatly to be regretted that he is passing away. Books built on lines like those which Dr. Shufeldt follows will tend to render the time of his total extermination far distant, and, in case a second edition of this work is called for, we hope that it will be developed largely on the model shown in the chapter on bats, to our mind the best chapter in the whole work. It would be well in a second edition to omit the final chapter on museums, which, as it now stands, has no *raison d'être.*

Origin of the Cleavage Centrosomes. — Boveri, in 1887, was the first to prove that the centrosome which gives rise to the centrosomes of the first cleavage spindle is brought into the egg by the spermatozoön. This observation, made on the egg of Ascaris, led to the formulation of the following conclusion by Boveri: "The ripe egg possesses all of the organs and qualities necessary for division excepting the centrosome, by which division is initiated. The spermatozoön, on the other hand, is provided with a centrosome, but lacks the substance in which this organ of division may exert its activity. Through the union of the two cells in fertilization all of the essential organs necessary for division are brought together; the egg now contains a centrosome which by its own division leads the way in the embryonic development."[1]

Additional evidence was soon furnished by Vejdovsky, who, in the case of Rhynchelmis, followed the disappearance of the egg centrosome, a thing which Boveri had not actually done. Fol, however, in 1891, described the remarkable process in the echinoderm egg, which he called the "Quadrille of Centers," and maintained that the egg centrosome and sperm centrosome divide, each into two, the daughter centrosomes then conjugating, a maternal with a paternal one, to form the two centrosomes of the first cleavage spindle. His paper was generally accepted, in spite of the earlier work on the subject, and was confirmed by the results of Guignard, Conklin, Blanc, Van der Stricht, and Schaffner. Belief in the existence of the "quadrille" was destined to be dissipated in the light of later research, and a score of investigators have definitely proved its mythical character; among these may be mentioned Fick, Wilson and Mathews, Mead, Boveri, Hill, Rückert, Reinke, Kostanecki and Wierzejski, Sobotta, and several others. A return has, therefore, been made to Boveri's original contention that the cleavage centrosomes are derived solely from the sperm centrosome, and, as the

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[1] *The Cell in Development and Inheritance.* By E. B. Wilson. New York, 1896, pp. 141, 142.